Molecular Probes, Inc.
www.probes.com
P.O. Box 22010 · Eugene, OR 97402-0469 • (541) 465-8300

FAX Transmission Sheet

Date: 08/21/02

From: Koren J. Anderson, Ph.D. (Judi Ubando)

To: Examiner C. Maupin

Organization: USPTO- Group Art Unit 1637

Fax: 1-703-872-9306

Subject: Serial No. 09/557,275

You should receive 47 pages including this cover sheet.

 5-8354 • Shipping Address: 4849 Pitchford Ave., Eugene, OR 97402-9165

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Haugland and Yue

Serial No.: 09/557,275

Filed: April 24, 2000

For: **Aza-Benzazolium Containing Cyanine Dyes**

Examiner: C. Maupin

Group Art Unit: 1637

MARKED-UP VERSION OF THE CLAIMS

Assistant Commissioner for Patents
U.S. Patent and Trademark Office
Washington, D.C. 20231

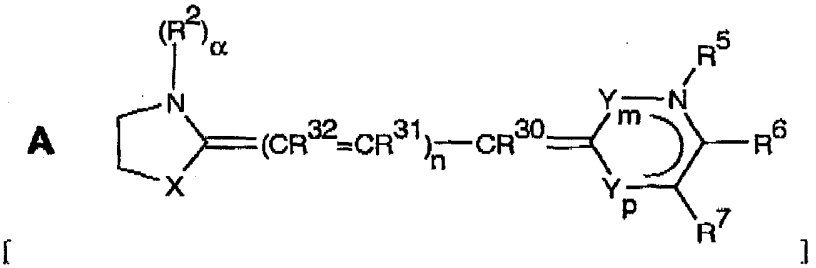
Dear Sir:

The following Marked-up Version of the Claims is hereby submitted together with a Clean Version of the Claims and the Response to Restriction Requirement on or before the due date of August 22, 2002.

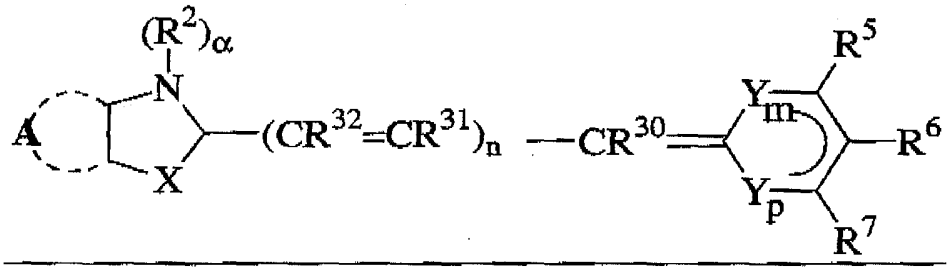
CERTIFICATE OF TRANSMISSION

I HEREBY CERTIFY THAT THIS PAPER AND THE DOCUMENTS REFERRED AS BEING ATTACHED OR ENCLOSED HEREWITH ARE BEING FACSIMILE TRANSMITTED TO THE UNITED STATES PATENT AND TRADMARK OFFICE ON 8/21/02 TO 1.703.872.9306 By Sandra M. Ubando

1. (Amended) A compound [of the] having formula



[ ]



wherein A represents the atoms necessary to form one to two fused aromatic rings having 6 atoms in each ring selected from the group consisting of –C-, CH or $N(R^2)^\beta$, provided at least one of [which] said ring atoms is [a nitrogen atom] $N(R^2)^\beta$[, said ring or rings being] wherein aromatic carbon atoms are optionally [further] substituted one or more times by substituents selected from the group consisting of hydrogen, alkyl having from 1-6 carbons, alkoxy having from 1-6 carbons, trifluoromethyl, halogen, methylthio, [or] -L--R_x[; or] and -L-S_c;

X is selected from the group consisting of O, S, Se, NR^{15}, [or] and $CR^{16}R^{17}$[,] wherein R^{15} is [H] hydrogen or an alkyl group having 1-6 carbons[;] and R^{16} and R^{17}[, which may be the same or different,] are independently alkyl groups having 1-6 carbons, or R^{16} and R^{17} taken in combination complete a five or six membered saturated ring;

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Haugland and Yue	)	
Serial No.: 09/557,275	)	Examiner: C. Maupin
Filed: April 24, 2000	)	Group Art Unit: 1637
For: **Aza-Benzazolium Containing Cyanine Dyes**	)	**MARKED-UP VERSION OF THE CLAIMS**

Assistant Commissioner for Patents
U.S. Patent and Trademark Office
Washington, D.C. 20231

Dear Sir:

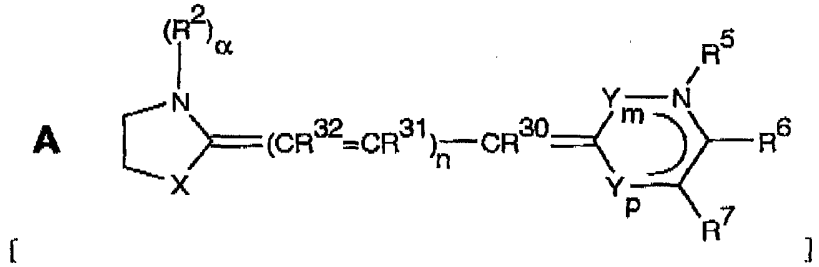
The following Marked-up Version of the Claims is hereby submitted together with a Clean Version of the Claims and the Response to Restriction Requirement on or before the due date of August 22, 2002.

CERTIFICATE OF TRANSMISSION

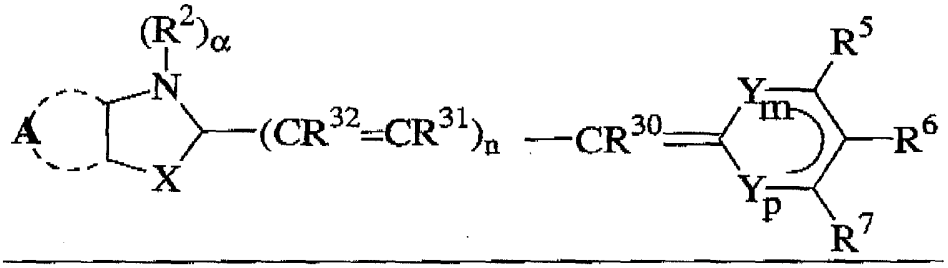
I HEREBY CERTIFY THAT THIS PAPER AND THE DOCUMENTS REFERRED AS BEING ATTACHED OR ENCLOSED HEREWITH ARE BEING FACSIMILE TRANSMITTED TO THE UNITED STATES PATENT AND TRADMARK OFFICE ON 8/21/02 TO 1.703.872.9306 By Judith M. Ukmade

Haugland and Yue
Serial No. 09/557,275

1. (Amended) A compound [of the] having formula



[ ]



wherein A represents the atoms necessary to form one to two fused aromatic rings having 6 atoms in each ring selected from the group consisting of –C-, CH or $N(R^2)^{\beta}$, provided at least one of [which] said ring atoms is [a nitrogen atom] $N(R^2)^{\beta}$[, said ring or rings being] wherein aromatic carbon atoms are optionally [further] substituted one or more times by substituents selected from the group consisting of hydrogen, alkyl having from 1-6 carbons, alkoxy having from 1-6 carbons, trifluoromethyl, halogen, methylthio, [or] -L--R_x[; or] and -L-S_c;

X is selected from the group consisting of O, S, Se, NR^{15}, [or] and $CR^{16}R^{17}$[,] wherein R^{15} is [H] hydrogen or an alkyl group having 1-6 carbons[;] and R^{16} and R^{17}[, which may be the same or different,] are independently alkyl groups having 1-6 carbons, or R^{16} and R^{17} taken in combination complete a five or six membered saturated ring;

α is 0 or 1 and β is 0 or 1 provided that α + all $\beta = 1$;

R^2 is selected from the group consisting of -L-R_x, -L-S_c, TAIL, BRIDGE and an alkyl group having 1-6 carbons that is optionally substituted by [sulfonate] sulfo, carboxy, or amino; [or R^2 is -L-R_x or -L-S_c; or TAIL; or BRIDGE-DYE]

n = 0, 1 or 2;

Y is $-CR^3=CR^4-$;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently selected from the group consisting of hydrogen [H;], an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons[; or] , a halogen[; or], a CYCLIC SUBSTITUENT[; or], $-OR^8$, $-SR^8$, $-(NR^8R^9)$[; or], TAIL[; or], BRIDGE[-DYE; or], -L-R_x[; or] and -L-S_c[;] wherein R^8 and R^9[, which can be the same or different,] are independently alkyl groups having 1-6 carbons[;] or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are [$-(CH_2)_2$-V-$(CH_2)_2$- where V] $-(CH_2)_2$-W-$(CH_2)_2$- where W is a single bond, -O-, $-CH_2-$, or $-NR^{10}-$, where R^{10} is H or an alkyl having 1-6 carbons;

or R^6 and R^7 taken in combination form a fused 6-membered aromatic ring [$-R^{11}=R^{12}-R^{13}=R^{14}-$] wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are [optionally and] independently selected from the group consisting of hydrogen, halogen, [alkyl that are saturated or unsaturated, linear or branched, having 1-6 carbons; or] $-OR^8$, $-SR^8$, [or] $-(NR^8R^9)$[; or] a CYCLIC SUBSTITUENT[; or a], TAIL[; or], BRIDGE[-DYE; or], -L--R_x[; or], -L-S_c[;] and a saturated or unsaturated alkyl having 1-6 carbons that is linear or branched;

R^5 is selected from the group consisting of [an alkyl that is saturated or unsaturated,

linear or branched, having 1-6 carbons; or R^5 is a] CYCLIC SUBSTITUENT[; or R^5 is], TAIL[; or], BRIDGE[-DYE; or], -L-R_x[; or], -L-S_c[; or R^5 is], a pair of electrons, sulfoalkyl and a saturated or unsaturated alkyl having 1-6 carbons that is linear or branched;

R^{30}, R^{31}, and R^{32} are independently selected from the group consisting of hydrogen, [H, C_1-C_6] alkyl having 1-6 carbons, cycloalkyl having 3-10 carbons, aryl, [or] and heteroaryl; and,

when present, BRIDGE is attached to a DYE compound provided that no more than one of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15} is BRIDGE;

wherein

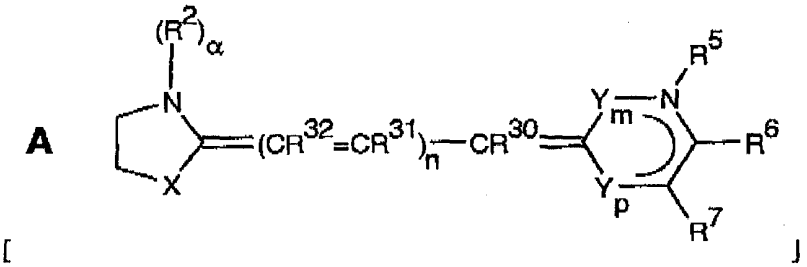
L and BRIDGE are independently a single covalent bond[,] or a covalent linkage [that is linear or branched, cyclic or heterocyclic, saturated or unsaturated,] having [1-16] 1-20 nonhydrogen atoms selected from the group consisting of C, N, [P,] O and S[, such that the linkage contains any combination of ether, thioether, amine, ester, amide bonds; or single, double, triple or aromatic carbon-carbon bonds; or phosphorus-oxygen, phosphorus-sulfur bonds, nitrogen-nitrogen or nitrogen-oxygen bonds; or aromatic or heteroaromatic bonds];

R_x is a reactive group;

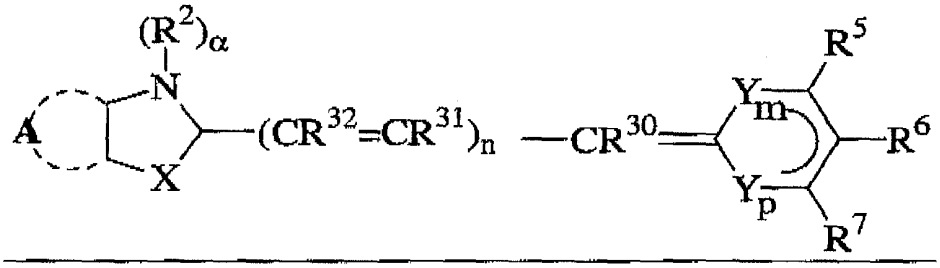
S_c is a conjugated substance;

TAIL is a heteroatom-containing moiety;

DYE is a compound [of the] having formula



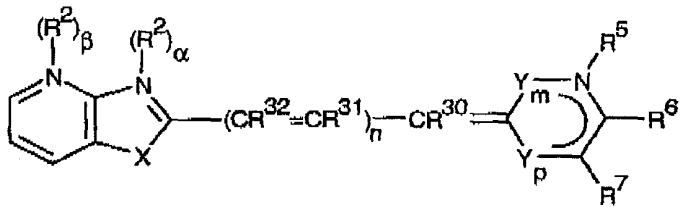
[ ]



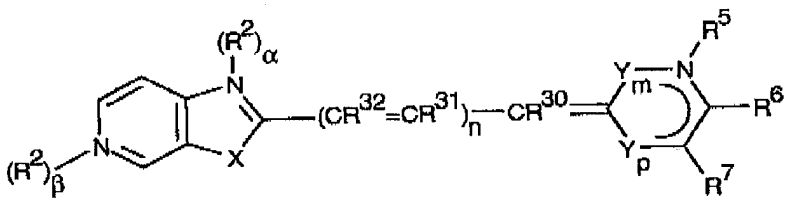
wherein A, X, R^2, α, n, Y_m, Y_p, [R^3, R^4,] R^5, R^6, R^7, [R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, R^{20}, R^{21}, R^{22}, R^{23}, R^{24},] R^{30}, R^{31}[,] and R^{32}[, TAIL, CYCLIC SUBSTITUENT] are as defined above provided that BRIDGE not be any of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15} [;].

[that is bound to BRIDGE at one of R^3, R^4, R^5, R^6, or R^7.]

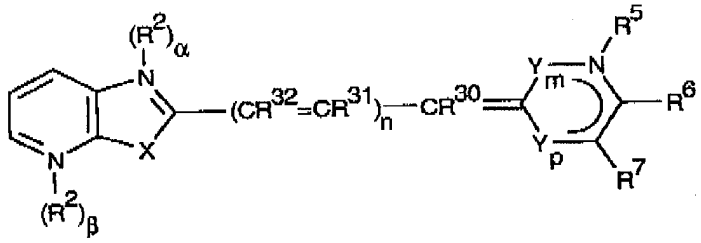
2. (Amended) [A] The compound[, as claimed in] according to Claim 1, having the formula selected from the group consisting of



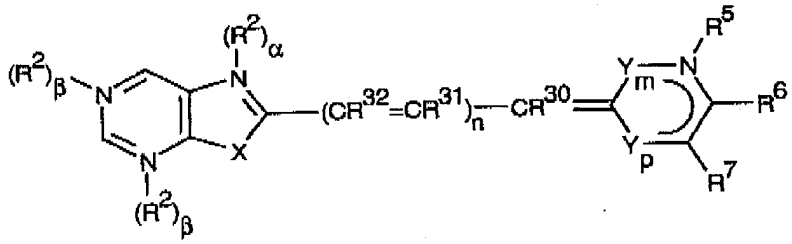
[the formula]



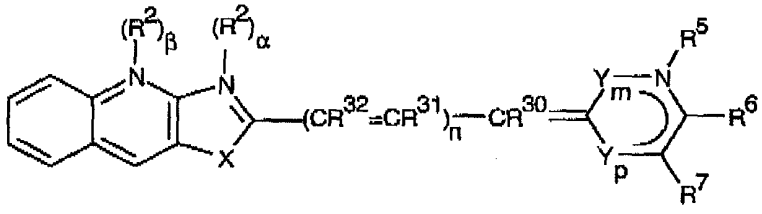
[the formula]



[the formula]



[or the formula] and



[,].

[wherein either α or a β is 1.]

3. (Amended) [A] The compound[, as claimed in] according to Claim 1, wherein said TAIL [is a heteroatom-containing moiety having the] comprises formula LINK-SPACER-CAP;

wherein

LINK is a single covalent bond, -O-, -S-, or -NR^{20}-; where R^{20} is [H] hydrogen, a linear or branched alkyl having 1-8 carbons, or [R^{20} is] -SPACER'-CAP';

SPACER and SPACER'[, which may be the same or different] are individually covalent linkages[,] that are linear or branched, cyclic or heterocyclic, saturated or unsaturated, [each] having 1-16 nonhydrogen atoms selected from the group consisting of C, N, P, O and S[, such that the linkage contains any combination of ether, thioether, amine, ester, amide bonds; or single, double, triple or aromatic carbon-carbon bonds; or phosphorus-oxygen, phosphorus-sulfur bonds, nitrogen-nitrogen or nitrogen-oxygen bonds; or aromatic or heteroaromatic bonds];

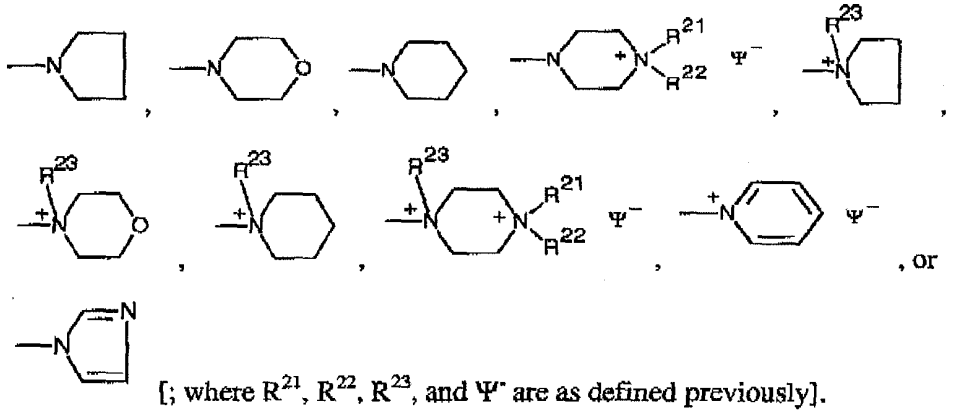
CAP and CAP'[, which may be the same or different,] are individually -O-R^{21}, -S-R^{21}, -$NR^{21}R^{22}$, or -$N^{+}R^{21}R^{22}R^{23}$ Ψ^{-};

wherein

R^{21}, R^{22}, and R^{23} are independently [H,] hydrogen or a linear or branched alkyl having 1-6 carbons or cycloalkyl having [1-8] 3-8 carbons, wherein said alkyl is optionally further substituted by substituents selected from the group consisting of halogen, hydroxy, alkoxy having 1-8 carbons, [carboxyalkyl having 1-8 carbons,], amino, carboxy, sulfo [or] and phenyl, wherein said phenyl is optionally further substituted by substituents selected from the group consisting of halogen, hydroxy, alkoxy having 1-8 carbons, aminoalkyl having 1-8 carbons, sulfoalkyl [or] and carboxyalkyl having 1-8 carbons; or[,] one or more of R^{21}, R^{22} and R^{23}, taken in combination with SPACER [or SPACER' or] and R^{20} or SPACER alone forms a 5- or 6-membered aromatic, heteroaromatic, alicyclic or heteroalicyclic ring, the heteroatoms selected from O, N or S; where Ψ^- is a compatible counterion;

or

CAP and CAP' are independently



[; where R^{21}, R^{22}, R^{23}, and Ψ^- are as defined previously].

4. (Amended) [A] The compound[, as claimed in] according to Claim [1] 2, wherein each R^2 is independently ethyl or methyl, each X is independently O or S, each n is independently 0 or 1, and R^{30}, R^{31}, and R^{32} are each [H] hydrogen.

5. (Amended) [A] The compound[, as claimed in] according to Claim [1] 2, wherein at least one R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, and R^{14} is a CYCLIC SUBSTITUENT [that is a substituted or unsubstituted] selected from the group consisting of [naphthyl, phenyl, thienyl,] aryl, heteroaryl, [or] and cycloalkyl having [3-8] 3-10 carbons wherein said CYCLIC SUBSTITUENT is individually and optionally substituted by TAIL, halogen, amino, or an alkyl containing moiety comprising 1-6 carbons.

6. (Amended) [A] The compound[, as claimed in] according to Claim [1] 3, wherein said TAIL comprises LINK that is a single covalent bond or NR^{20} wherein R^{20} is hydrogen or an alkyl; SPACER and SPACER' that are independently a linear alkyl having 1-8 carbons or a 6-membered carbon ring; CAP and CAP'[, which may be the same or different,] that are individually $-NR^{21}R^{22}$, or $-N^+R^{21}R^{22}R^{23}\ \Psi^-$, wherein R^{21}, R^{22}, and R^{23} are independently hydrogen, [H, or a linear or branched] alkyl or cycloalkyl [having 1-8 carbons; R^{20} is H or a linear or branched alkyl having 1-8 carbons; and SPACER and SPACER' are independently linear alkylenes alkyl having 1-8 carbons; or incorporate a phenylene ring].

7. (Amended) [A] The compound[, as claimed in] according to Claim [1] 6, wherein R^4 is a TAIL or BRIDGE[-DYE].

8. (Amended) [A] The compound[, as claimed in] according to Claim [1] 6, wherein R^5 is a TAIL[; or], a CYCLIC SUBSTITUENT[;], or BRIDGE[-DYE].

9. (Amended) [A] The compound[, as claimed in] according to Claim 8, wherein R^5 is a TAIL or a BRIDGE[-DYE, and] wherein TAIL and BRIDGE incorporate at least one quaternary nitrogen atom.

10. (Amended) [A] The compound[, as claimed in] according to Claim [1] 2, wherein each R^3, R^{11}, R^{12}, R^{13} and R^{14} is hydrogen.

11. (Amended) [A] The compound[, as claimed in] according to Claim [1] 3, wherein

R^5 is [a linear or branched] an alkyl [having 1-6 carbons;] and

R^4 is selected from the group consisting of halogen, [a] CYCLIC SUBSTITUENT, $-OR^8$, $-SR^8$, $-(NR^8R^9)$, TAIL, BRIDGE[-DYE], $-L-R_X$, [or] and $-L-S_C$.

12. (Amended) [A] The compound[, as claimed in] according to Claim 1, wherein S_C is selected from the group consisting of an amino acid, a peptide, a protein, a polysaccharide, a nucleotide, an oligonucleotide, a nucleic acid, a lipid, a polymeric microparticle, a biological cell, a DNA-binding protein [or] and a virus.

13. (Amended) [A] The compound[, as claimed in] according to Claim [1] 12, wherein S_C is an oligonucleotide, a nucleic acid, or a DNA-binding protein.

14. (Amended) [A] The compound[, as claimed in] according to Claim [2] 6, wherein

each X is O;

each n is independently = 0, 1, or 2;

each m = 1;

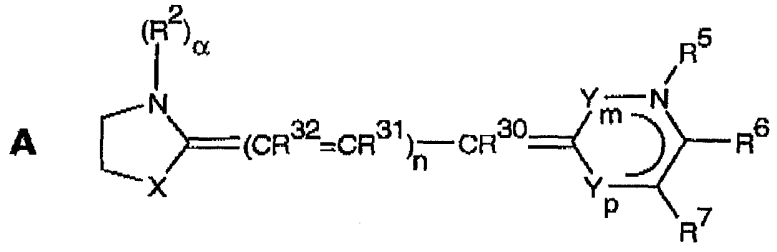
each R^{30}, R^{31}, and R^{32} are H; and

R^5 is selected from the group consisting of [a linear or branched] an alkyl [having 1-6 carbons], a TAIL, a CYCLIC SUBSTITUENT, [or] and a BRIDGE[-DYE].

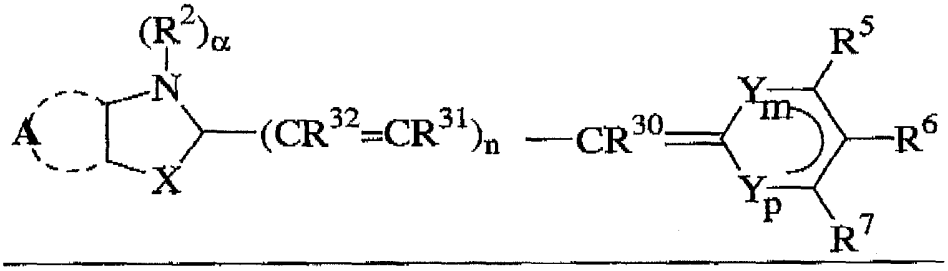
15. (Amended) A [fluorescent] complex comprising: [a nucleic acid polymer non-

covalently associated with one or more dye molecules, which may be the same or different, having the formula]

a) a compound having formula



[ ]



wherein A represents the atoms necessary to form one to two fused aromatic rings having 6 atoms in each ring selected from the group consisting of –C-, CH or $N(R^2)^{\beta}$, provided at least one of [which] said ring atoms is [a nitrogen atom] $N(R^2)^{\beta}$[, said ring or rings being] wherein aromatic carbons are optionally [further] substituted one or more times by substituents selected from the group consisting of hydrogen, alkyl having from 1-6 carbons, alkoxy having from 1-6 carbons, trifluoromethyl, halogen, methylthio, [or] -L--R_x[; or] and -L-S_c;

X is selected from the group consisting of O, S, Se, NR^{15}, [or] and $CR^{16}R^{17}$[,] wherein R^{15} is [H] hydrogen or an alkyl group having 1-6 carbons[;] and R^{16} and R^{17}[, which may be the same or different,] are independently alkyl groups having 1-6 carbons, or R^{16} and

R^{17} taken in combination complete a five or six membered saturated ring;

α is 0 or 1 and β is 0 or 1 provided that α + all β = 1;

R^2 is selected from the group consisting of -L-R_x, -L-S_c, TAIL, BRIDGE and an alkyl group having 1-6 carbons that is optionally substituted by [sulfonate] sulfo, carboxy, or amino; [or R^2 is -L-R_x or -L-S_c; or TAIL; or BRIDGE-DYE]

n = 0, 1 or 2;

Y is -CR^3=CR^4-;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently selected from the group consisting of hydrogen [H;], an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons[; or] , a halogen[; or], a CYCLIC SUBSTITUENT[; or], -OR^8, -SR^8, -(NR^8R^9)[; or], TAIL[; or], BRIDGE[-DYE; or], -L-R_x[; or] and -L-S_c[;] wherein R^8 and R^9[, which can be the same or different,] are independently alkyl groups having 1-6 carbons[;] or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are [-$(CH_2)_2$-V-$(CH_2)_2$- where V] -$(CH_2)_2$-W-$(CH_2)_2$- where W is a single bond, -O-, -CH_2-, or -NR^{10}-, where R^{10} is H or an alkyl having 1-6 carbons;

or R^6 and R^7 taken in combination form a fused 6-membered aromatic ring [–R^{11}=R^{12}–R^{13}=R^{14}–] wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are [optionally and] independently selected from the group consisting of hydrogen, halogen, [alkyl that are saturated or unsaturated, linear or branched, having 1-6 carbons; or] -OR^8, -SR^8, [or] -(NR^8R^9)[; or] a CYCLIC SUBSTITUENT[; or a], TAIL[; or], BRIDGE[-DYE; or], -L--R_x[; or], -L-S_c[;] and a saturated or unsaturated alkyl having 1-6 carbons that is linear or

branched;

R^5 is selected from the group consisting of [an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons; or R^5 is a] CYCLIC SUBSTITUENT[; or R^5 is], TAIL[; or], BRIDGE[-DYE; or], -L-R_x[; or], -L-S_c[; or R^5 is], a pair of electrons, sulfoalkyl and a saturated or unsaturated alkyl having 1-6 carbons that is linear or branched;

R^{30}, R^{31}, and R^{32} are independently selected from the group consisting of hydrogen [H, C_1-C_6] alkyl having 1-6 carbons, cycloalkyl having 3-10 carbons, aryl, [or] and heteroaryl; and,

when present, BRIDGE is attached to a DYE compound provided that no more than one of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15} is BRIDGE;

wherein

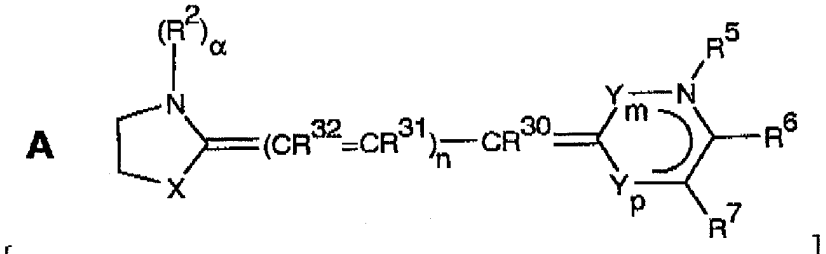
L and BRIDGE are independently a single covalent bond[,] or a covalent linkage [that is linear or branched, cyclic or heterocyclic, saturated or unsaturated,] having [1-16] 1-20 nonhydrogen atoms selected from the group consisting of C, N, [P,] O and S[, such that the linkage contains any combination of ether, thioether, amine, ester, amide bonds; or single, double, triple or aromatic carbon-carbon bonds; or phosphorus-oxygen, phosphorus-sulfur bonds, nitrogen-nitrogen or nitrogen-oxygen bonds; or aromatic or heteroaromatic bonds];

R_x is a reactive group;

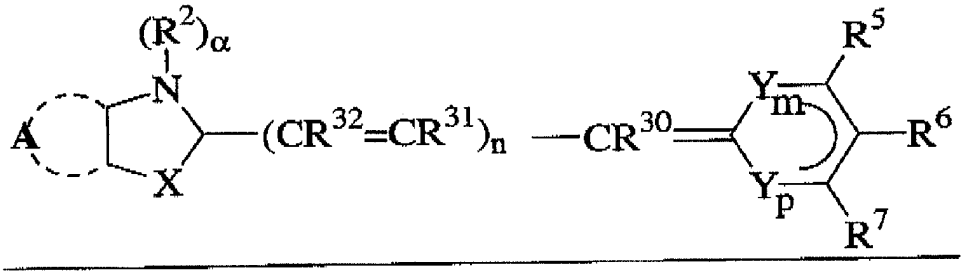
S_c is a conjugated substance;

TAIL is a heteroatom-containing moiety;

DYE is a compound [of the] having formula



[ ]



wherein A, X, R^2, α, n, Y_m, Y_p, [R^3, R^4,] R^5, R^6, R^7, [R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, R^{20}, R^{21}, R^{22}, R^{23}, R^{24},] R^{30}, R^{31}[,] and R^{32}[, TAIL, CYCLIC SUBSTITUENT] are as defined above provided that BRIDGE not be any of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15} [;].

[that is bound to BRIDGE at one of R^3, R^4, R^5, R^6, or R^7.] ;and

b) a nucleic acid polymer.

16. (Amended) [A fluorescent] The complex[, as claimed in] according to Claim 15, wherein [the] said nucleic acid polymer is a chromosome or fragment thereof, or a natural or synthetic oligonucleotide.

17. (Cancelled) A fluorescent complex, as claimed in Claim 15, wherein said complex is present in an electrophoretic matrix or in a flowing medium.

18. (Amended) [A fluorescent] The complex[, as claimed in] according to Claim [15] 16, wherein said nucleic acid is [obtained from a biological fluid] enclosed in a biological structure, free in solution, immobilized on a solid or semi-solid material or is extracted from a biological structure.

19. (Amended) [A fluorescent] The complex[, as claimed in] according to Claim [15] 18, wherein said complex is enclosed in a biological structure[, or] present in [an aqueous or aqueous miscible] a solution or on an inert matrix.

20. (Amended) [A fluorescent] The complex[, as claimed in] according to Claim 19 or 21, wherein said complex is enclosed in a biological structure [that is a cell].

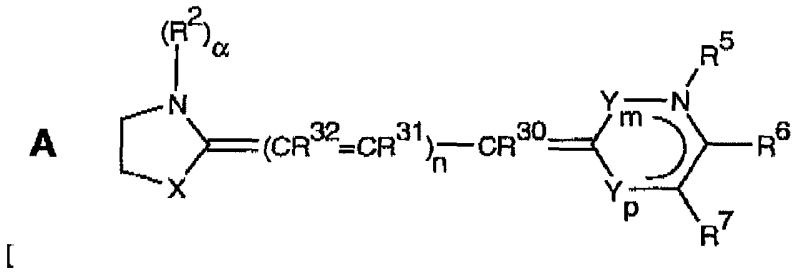
21. (Amended) [A fluorescent] The complex[, as claimed in] according to Claim [20] 18, wherein said biological structure is a cell and said cell is undergoing apoptosis, necrosis, or is in a cycle of [growth or] cell division.

22. (Amended) [A fluorescent] The complex[, as claimed in] according to Claim 15, wherein at least one [dye molecule] compound is substituted by -L-S_C[,] wherein S_C is selected from the group consisting of [a] hapten, [a] nucleotide, [an] oligonucleotide, [a] nucleic acid polymer, [a] protein, [or a] polysaccharide and DNA binding protein.

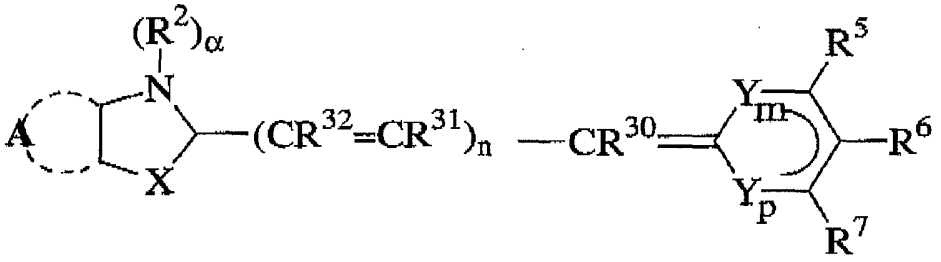
23. (Cancelled) A compound, as claimed in Claim 22, wherein S_C is an oligonucleotide, a nucleic acid, or a DNA-binding protein.

24. (Amended) A [composition] complex comprising:

a) [one or more cyanine dyes] a compound having [the] formula:



[ ]



wherein A represents the atoms necessary to form one to two fused aromatic rings having 6 atoms in each ring selected from the group consisting of –C-, CH or $N(R^2)^{\beta}$, provided at least one of [which] said ring atoms is [a nitrogen atom] $N(R^2)^{\beta}$[, said ring or rings being] wherein aromatic carbons are optionally [further] substituted one or more times by substituents selected from the group consisting of hydrogen, alkyl having from 1-6 carbons, alkoxy having from 1-6 carbons, trifluoromethyl, halogen, methylthio, [or] -L--R_x[; or] and -L-S_c;

X is selected from the group consisting of O, S, Se, NR^{15}, [or] and $CR^{16}R^{17}$[,] wherein R^{15} is H or an alkyl group having 1-6 carbons[;] and R^{16} and R^{17}[, which may be the same or different,] are independently alkyl groups having 1-6 carbons, or R^{16} and R^{17} taken in combination complete a five or six membered saturated ring;

α is 0 or 1 and β is 0 or 1 provided that α + all β = 1;

R^2 is selected from the group consisting of -L-R_x, -L-S_c, TAIL, BRIDGE and an alkyl group having 1-6 carbons that is optionally substituted by [sulfonate] sulfo, carboxy, or amino; [or R^2 is -L-R_x or -L-S_c; or TAIL; or BRIDGE-DYE]

n = 0, 1 or 2;

Y is -CR^3=CR^4-;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently selected from the group consisting of hydrogen [H;], an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons[; or] , a halogen[; or], a CYCLIC SUBSTITUENT[; or], -OR^8, -SR^8, -(NR^8R^9)[; or], TAIL[; or], BRIDGE[-DYE; or], -L-R_x[; or] and -L-S_c[;] wherein R^8 and R^9[, which can be the same or different,] are independently alkyl groups having 1-6 carbons[;] or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are [-$(CH_2)_2$-V-$(CH_2)_2$- where V] -$(CH_2)_2$-W-$(CH_2)_2$- where W is a single bond, -O-, -CH_2-, or -NR^{10}-, where R^{10} is H or an alkyl having 1-6 carbons;

or R^6 and R^7 taken in combination form a fused 6-membered aromatic ring [–R^{11}=R^{12}–R^{13}=R^{14}–] wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are [optionally and] independently selected from the group consisting of hydrogen, halogen, [alkyl that are saturated or unsaturated, linear or branched, having 1-6 carbons; or] -OR^8, -SR^8, [or] -(NR^8R^9)[; or] a CYCLIC SUBSTITUENT[; or a], TAIL[; or], BRIDGE[-DYE; or], -L--R_x[; or], -L-S_c[;] and a saturated or unsaturated alkyl having 1-6 carbons that is linear or branched;

R^5 is selected from the group consisting of [an alkyl that is saturated or unsaturated,

linear or branched, having 1-6 carbons; or R^5 is a] CYCLIC SUBSTITUENT[; or R^5 is], TAIL[; or], BRIDGE[-DYE; or], -L-R_x[; or], -L-S_c[; or R^5 is], a pair of electrons, sulfoalkyl and a saturated or unsaturated alkyl having 1-6 carbons that is linear or branched;

R^{30}, R^{31}, and R^{32} are independently selected from the group consisting of hydrogen, [H, C_1-C_6] alkyl having 1-6 carbons, cycloalkyl having 3-10 carbons, aryl, [or] and heteroaryl; and,

when present, BRIDGE is attached to a DYE compound provided that no more than one of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15} is BRIDGE;

wherein

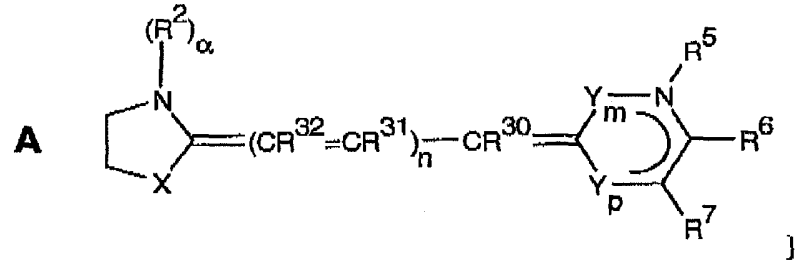
L and BRIDGE are independently a single covalent bond[,] or a covalent linkage [that is linear or branched, cyclic or heterocyclic, saturated or unsaturated,] having [1-16] 1-20 nonhydrogen atoms selected from the group consisting of C, N, [P,] O and S[, such that the linkage contains any combination of ether, thioether, amine, ester, amide bonds; or single, double, triple or aromatic carbon-carbon bonds; or phosphorus-oxygen, phosphorus-sulfur bonds, nitrogen-nitrogen or nitrogen-oxygen bonds; or aromatic or heteroaromatic bonds];

R_x is a reactive group;

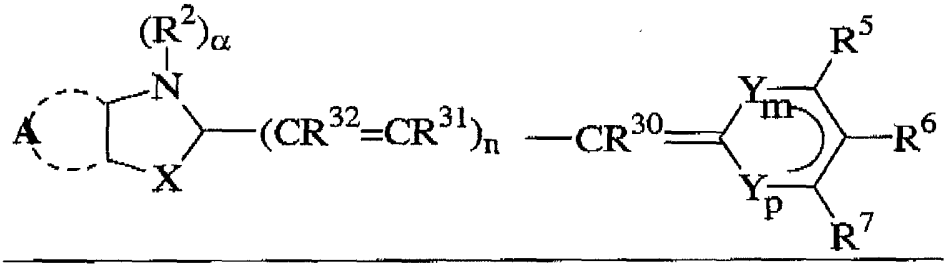
S_c is a conjugated substance;

TAIL is a heteroatom-containing moiety;

DYE is a compound [of the] having formula



[ ]



wherein A, X, R^2, α, n, Y_m, Y_p, [R^3, R^4,] R^5, R^6, R^7, [R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, R^{20}, R^{21}, R^{22}, R^{23}, R^{24},] R^{30}, R^{31}[,] and R^{32}[, TAIL, CYCLIC SUBSTITUENT] are as defined above provided that BRIDGE not be any of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15}; and,

[that is bound to BRIDGE at one of R^3, R^4, R^5, R^6, or R^7.]

[b) a detergent; and]

[c)] b) a poly(amino acid)[,].

[in a cell-free aqueous solution where said detergent is present at a concentration less than the critical micelle concentration for that detergent.]

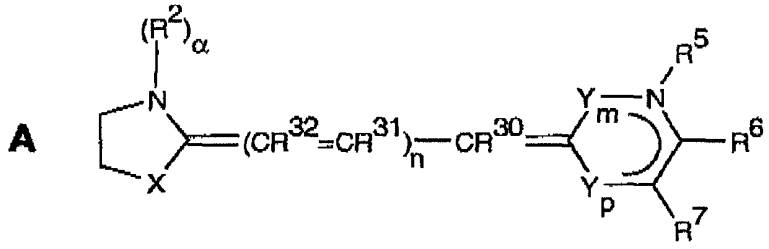
25. (Amended) [A] The [composition, as claimed in] complex according to Claim [24] 51, where said detergent is an alkyl sulfate or alkyl sulfonate salt.

26. (Amended) [A] The [composition, as claimed in] complex according to Claim [24] 25, wherein said poly(amino acids) are present on or in a solid or semi-solid matrix.

27. (Amended) [A] The [composition, as claimed in] complex according to Claim 26, wherein said matrix is a membrane or an electrophoretic gel.

28. (Withdrawn) A method of staining poly(amino acids), comprising the steps of:

a) combining a sample that contains or is thought to contain a poly(amino acid) with a staining mixture that contains one or more dyes having the formula



wherein A represents the atoms necessary to form one to two fused aromatic rings having 6 atoms in each ring, at least one of which is a nitrogen atom, said ring or rings being optionally further substituted one or more times by alkyl having from 1-6 carbons, alkoxy having from 1-6 carbons, trifluoromethyl, halogen, or -L-R_x; or -L-S_c;

X is O, S, Se, NR^{15}, or $CR^{16}R^{17}$, where R^{15} is H or an alkyl group having 1-6 carbons; and R^{16} and R^{17}, which may be the same or different, are independently alkyl groups having 1-6 carbons, or R^{16} and R^{17} taken in combination complete a five or six membered saturated ring;

α is 0 or 1;

R^2 is an alkyl group having 1-6 carbons that is optionally substituted by sulfonate, carboxy, or amino; or R^2 is -L-R_x or -L-S_c; or TAIL; or BRIDGE-DYE;

n = 0, 1 or 2;

Y is $-CR^3=CR^4-$;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently H; an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons; or a halogen; or a CYCLIC SUBSTITUENT; or $-OR^8$, $-SR^8$, $-(NR^8R^9)$; or TAIL; or BRIDGE-DYE; or -L-R_x; or -L-S_c; where R^8 and R^9, which can be the same or different, are independently alkyl groups having 1-6 carbons; or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are $-(CH_2)_2-V-(CH_2)_2-$ where V is a single bond, -O-, $-CH_2-$, or $-NR^{10}-$, where R^{10} is H or an alkyl having 1-6 carbons;

or R^6 and R^7 form a fused aromatic ring $-R^{11}=R^{12}-R^{13}=R^{14}-$ wherein R^{11}, R^{12}, R^{13}, and R^{14} are optionally and independently alkyl that are saturated or unsaturated, linear or branched, having 1-6 carbons; or $-OR^8$, $-SR^8$, or $-(NR^8R^9)$; or a CYCLIC SUBSTITUENT; or a TAIL; or BRIDGE-DYE; or -L-R_x; or -L-S_c;

R^5 is an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons; or R^5 is a CYCLIC SUBSTITUENT; or R^5 is TAIL; or BRIDGE-DYE; or -L-R_x; or -L-S_c; or R^5 is a pair of electrons;

R^{30}, R^{31}, and R^{32} are independently H, C_1-C_6 alkyl having 1-6 carbons, cycloalkyl having

3-10 carbons, aryl, or heteroaryl;

wherein

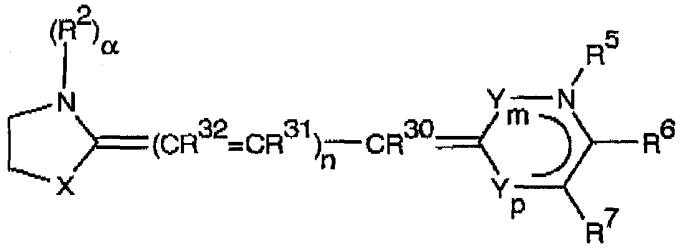
L and BRIDGE are independently a single covalent bond, or a covalent linkage that is linear or branched, cyclic or heterocyclic, saturated or unsaturated, having 1-16 nonhydrogen atoms selected from the group consisting of C, N, P, O and S, such that the linkage contains any combination of ether, thioether, amine, ester, amide bonds; or single, double, triple or aromatic carbon-carbon bonds; or phosphorus-oxygen, phosphorus-sulfur bonds, nitrogen-nitrogen or nitrogen-oxygen bonds; or aromatic or heteroaromatic bonds;

R_x is a reactive group;

S_c is a conjugated substance;

TAIL is a heteroatom-containing moiety;

DYE is a compound of the formula

A 

wherein A, X, R^2, α, n, Y_m, Y_p, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14},

R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, R^{20}, R^{21}, R^{22}, R^{23}, R^{24}, R^{30}, R^{31}, R^{32}, TAIL, CYCLIC SUBSTITUENT are as defined above;

that is bound to BRIDGE at one of R^3, R^4, R^5, R^6, or R^7;

b) incubating the combined mixture for a time sufficient for the dye in the staining mixture to associate with the poly(amino acid) in the sample mixture to form a dye-poly(amino acid) complex that gives a detectable optical response upon illumination;

d) illuminating said dye-poly(amino acid) complex; and

e) observing said detectable optical response.

29. (Withdrawn) A method, as claimed in Claim 28, further comprising heating the sample mixture prior to combining with the staining mixture, or heating the combined mixture.

30. (Withdrawn) A method, as claimed in Claim 28, further comprising removing, destroying, or dispersing below the critical micelle concentration any biological membranes that are present in the sample mixture.

31. (Withdrawn) A method, as claimed in Claim 28, further comprising adding an anionic detergent to the sample mixture, staining mixture or combined mixture.

32. (Withdrawn) A method, as claimed in Claim 31, wherein said detergent is an alkyl sulfate or alkyl sulfonate salt having 6-18 carbons; that is present in a concentration of less than 0.1% by weight.

33. (Withdrawn) A method, as claimed in Claim 28, wherein said detectable optical response is a colorimetric response.

34. (Withdrawn) A method, as claimed in Claim 28, wherein said detectable optical response is a fluorescence response.

35. (Withdrawn) A method, as claimed in Claim 28, further comprising quantitating said poly(amino acid) by measuring said detectable optical response and comparing said measurement with a standard.

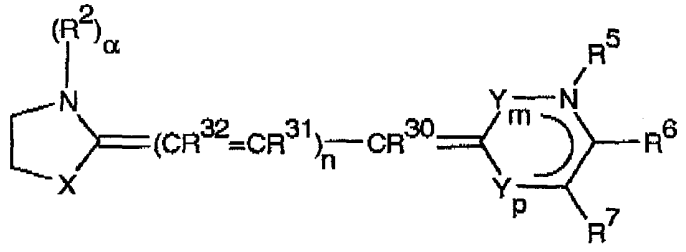
36. (Withdrawn) A method, as claimed in Claim 28, further comprising electrophoretically separating the sample mixture before, after, or while it is combined with the staining mixture.

37. (Withdrawn) A method, as claimed in Claim 28, further comprising transferring the sample mixture to a solid or semi-solid matrix before or after combining with the staining mixture.

38. (Withdrawn) A method, as claimed in Claim 28, further comprising adding an additional reagent to the sample mixture, the staining mixture, or the combined mixture.

39. (Withdrawn) A method of staining nucleic acids, comprising

a) combining a sample that contains or is thought to contain a nucleic acid with a mixture containing a dye compound of the formula

A 

wherein A represents the atoms necessary to form one to two fused aromatic rings having 6 atoms in each ring, at least one of which is a nitrogen atom, said ring or rings being optionally further substituted one or more times by alkyl having from 1-6 carbons, alkoxy having from 1-6 carbons, trifluoromethyl, halogen, or -L-R_x; or -L-S_c;

X is O, S, Se, NR^{15}, or $CR^{16}R^{17}$, where R^{15} is H or an alkyl group having 1-6 carbons; and R^{16} and R^{17}, which may be the same or different, are independently alkyl groups having 1-6 carbons, or R^{16} and R^{17} taken in combination complete a five or six membered saturated ring;

α is 0 or 1;

R^2 is an alkyl group having 1-6 carbons that is optionally substituted by sulfonate, carboxy, or amino; or R^2 is -L-R_x or -L-S_c; or TAIL; or BRIDGE-DYE;

n = 0, 1 or 2;

Y is $-CR^3=CR^4-$;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently H; an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons; or a halogen; or a CYCLIC SUBSTITUENT; or $-OR^8$, $-SR^8$, $-(NR^8R^9)$; or TAIL; or BRIDGE-DYE; or -L-R_x; or -L-S_c; where R^8 and R^9, which can be the same or different, are independently alkyl groups having 1-6 carbons; or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are $-(CH_2)_2-V-(CH_2)_2-$ where V is a single bond, -O-, $-CH_2-$, or $-NR^{10}-$, where R^{10} is H or an alkyl having 1-6

carbons;

or R^6 and R^7 form a fused aromatic ring $-R^{11}=R^{12}-R^{13}=R^{14}-$ wherein R^{11}, R^{12}, R^{13}, and R^{14} are optionally and independently alkyl that are saturated or unsaturated, linear or branched, having 1-6 carbons; or $-OR^8$, $-SR^8$, or $-(NR^8R^9)$; or a CYCLIC SUBSTITUENT; or a TAIL; or BRIDGE-DYE; or $-L-R_x$; or $-L-S_c$;

R^5 is an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons; or R^5 is a CYCLIC SUBSTITUENT; or R^5 is TAIL; or BRIDGE-DYE; or $-L-R_x$; or $-L-S_c$; or R^5 is a pair of electrons;

R^{30}, R^{31}, and R^{32} are independently H, C_1-C_6 alkyl having 1-6 carbons, cycloalkyl having 3-10 carbons, aryl, or heteroaryl;

wherein

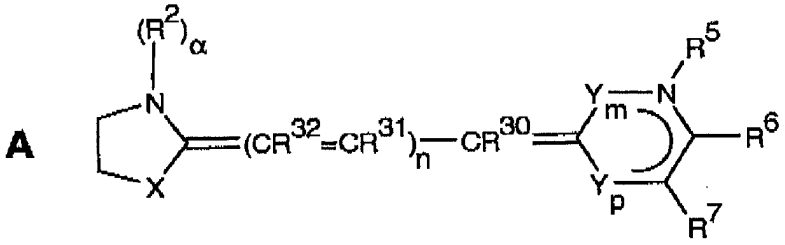
L and BRIDGE are independently a single covalent bond, or a covalent linkage that is linear or branched, cyclic or heterocyclic, saturated or unsaturated, having 1-16 nonhydrogen atoms selected from the group consisting of C, N, P, O and S, such that the linkage contains any combination of ether, thioether, amine, ester, amide bonds; or single, double, triple or aromatic carbon-carbon bonds; or phosphorus-oxygen, phosphorus-sulfur bonds, nitrogen-nitrogen or nitrogen-oxygen bonds; or aromatic or heteroaromatic bonds;

R_x is a reactive group;

S_c is a conjugated substance;

TAIL is a heteroatom-containing moiety;

DYE is a compound of the formula



wherein A, X, R^2, α, n, Y_m, Y_p, R^3, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, R^{20}, R^{21}, R^{22}, R^{23}, R^{24}, R^{30}, R^{31}, R^{32}, TAIL, CYCLIC SUBSTITUENT are as defined above;

that is bound to BRIDGE at one of R^3, R^4, R^5, R^6, or R^7;

b) incubating the sample and mixture for a time sufficient for the dye compound to combine with the nucleic acid in the sample to form one or more dye-nucleic acid complexes that give a detectable fluorescent signal.

40. (Withdrawn) A method of staining nucleic acids, as claimed in Claim 39, wherein said sample or said mixture comprises an electrophoretic gel.

41. (Withdrawn) A method of staining nucleic acids, as claimed in Claim 39, wherein the sample comprises a biological fluid.

42. (Withdrawn) A method of staining nucleic acids, as claimed in Claim 39, wherein the sample comprises cells.

43. (Withdrawn) A method of staining nucleic acids, according to Claim 39, where the

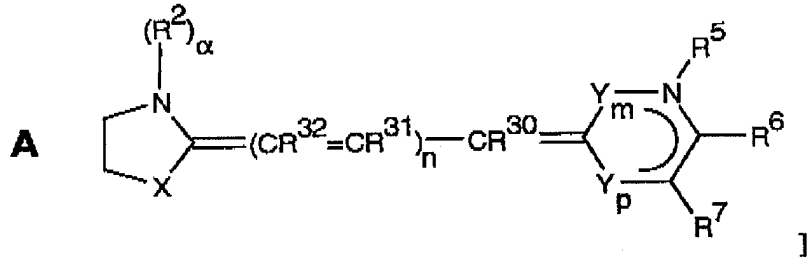
sample comprises cell-free nucleic acids.

44. (Amended) A kit[,] comprising:

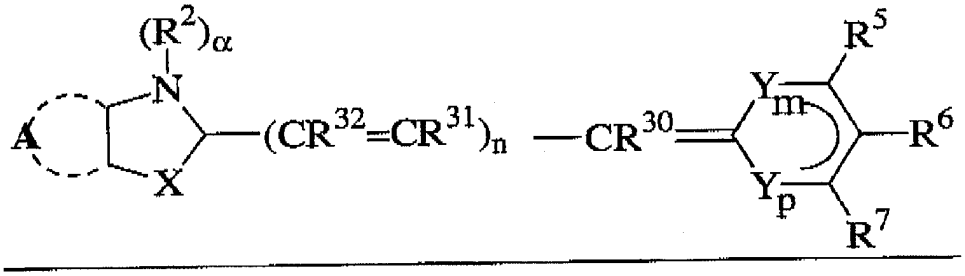
a) a stock solution comprising:

i) one or more compounds individually having formula:

[a) a compound of the formula]



[ ]



wherein A represents the atoms necessary to form one to two fused aromatic rings having 6 atoms in each ring selected from the group consistng of –C-, CH or $N(R^2)^{\beta}$, provided at least one of [which] said ring atoms is [a nitrogen atom] $N(R^2)^{\beta}$[, said ring or rings being] wherein aromatic carbons are optionally [further] substituted one or more times by substituents selected from the group consisting of hydrogen, alkyl having from 1-6 carbons, alkoxy having from 1-6 carbons, trifluoromethyl, halogen, methylthio, [or] -L--R_x[; or] and -L-S_c;

X is selected from the group consisting of O, S, Se, NR^{15}, [or] and $CR^{16}R^{17}$[,] wherein R^{15} is [H] hydrogen or an alkyl group having 1-6 carbons[;] and R^{16} and R^{17}[, which may be the same or different,] are independently alkyl groups having 1-6 carbons, or R^{16} and R^{17} taken in combination complete a five or six membered saturated ring;

α is 0 or 1 and β is 0 or 1 provided that α + all β = 1;

R^2 is selected from the group consisting of -L-R_x, -L-S_c, TAIL, BRIDGE and an alkyl group having 1-6 carbons that is optionally substituted by [sulfonate] sulfo, carboxy, or amino; [or R^2 is -L-R_x or -L-S_c; or TAIL; or BRIDGE-DYE]

n = 0, 1 or 2;

Y is $-CR^3=CR^4-$;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently selected from the group consisting of hydrogen [H;], an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons[; or] , a halogen[; or], a CYCLIC SUBSTITUENT[; or], $-OR^8$, $-SR^8$, $-(NR^8R^9)$[; or], TAIL[; or], BRIDGE[-DYE; or], -L-R_x[; or] and -L-S_c[;] wherein R^8 and R^9[, which can be the same or different,] are independently alkyl groups having 1-6 carbons[;] or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are [$-(CH_2)_2$-V-$(CH_2)_2$- where V] $-(CH_2)_2$-W-$(CH_2)_2$- where W is a single bond, -O-, $-CH_2-$, or $-NR^{10}-$, where R^{10} is H or an alkyl having 1-6 carbons;

or R^6 and R^7 taken in combination form a fused 6-membered aromatic ring [$-R^{11}=R^{12}-R^{13}=R^{14}-$] wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are [optionally and] independently selected from the group consisting of hydrogen, halogen, [alkyl that are saturated or unsaturated, linear or branched, having 1-6 carbons; or] $-OR^8$, $-SR^8$, [or] -

(NR^8R^9)[; or] a CYCLIC SUBSTITUENT[; or a], TAIL[; or], BRIDGE[-DYE; or], -L--R_x[; or], -L-S_c[;] and a saturated or unsaturated alkyl having 1-6 carbons that is linear or branched;

R^5 is selected from the group consisting of [an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons; or R^5 is a] CYCLIC SUBSTITUENT[; or R^5 is], TAIL[; or], BRIDGE[-DYE; or], -L-R_x[; or], -L-S_c[; or R^5 is], a pair of electrons, sulfoalkyl and a saturated or unsaturated alkyl having 1-6 carbons that is linear or branched;

R^{30}, R^{31}, and R^{32} are independently selected from the group consisting of H, [C_1-C_6] alkyl having 1-6 carbons, cycloalkyl having 3-10 carbons, aryl, [or] and heteroaryl; and,

when present, BRIDGE is attached to a DYE compound provided that no more than one of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15} is BRIDGE;

wherein

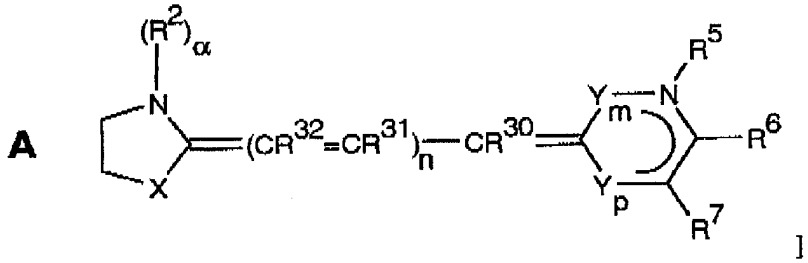
L and BRIDGE are independently a single covalent bond[,] or a covalent linkage [that is linear or branched, cyclic or heterocyclic, saturated or unsaturated,] having [1-16] 1-20 nonhydrogen atoms selected from the group consisting of C, N, [P,] O and S[, such that the linkage contains any combination of ether, thioether, amine, ester, amide bonds; or single, double, triple or aromatic carbon-carbon bonds; or phosphorus-oxygen, phosphorus-sulfur bonds, nitrogen-nitrogen or nitrogen-oxygen bonds; or aromatic or heteroaromatic bonds];

R_x is a reactive group;

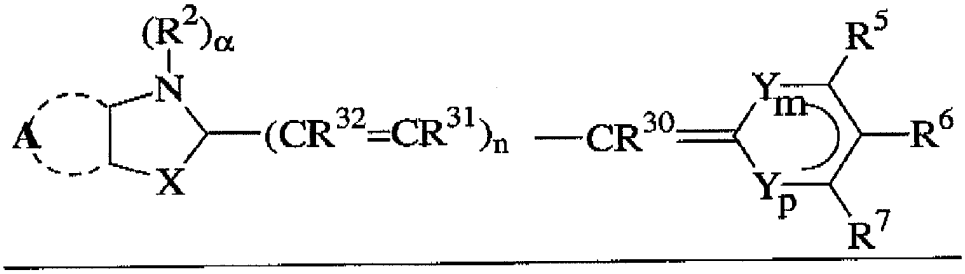
S_c is a conjugated substance;

TAIL is a heteroatom-containing moiety;

DYE is a compound [of the] having formula



[ ]



wherein A, X, R^2, α, n, Y_m, Y_p, [R^3, R^4,] R^5, R^6, R^7, [R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13}, R^{14}, R^{15}, R^{16}, R^{17}, R^{18}, R^{19}, R^{20}, R^{21}, R^{22}, R^{23}, R^{24},] R^{30}, R^{31}[,] and R^{32}[, TAIL, CYCLIC SUBSTITUENT] are as defined above provided that BRIDGE not be any of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15};

[that is bound to BRIDGE at one of R^3, R^4, R^5, R^6, or R^7.]

[wherein said compound is present as a stock solution.]

ii) an organic solvent; and,

b) a buffer suitable for dilution of said stock solution.

45. (Cancelled) A kit, as claimed in Claim 44, further comprising a buffer suitable for dilution of the stock solution.

46. (Amended) [A] The kit[, as claimed in] according to Claim 44, further comprising a [fluorescence] standard, [a nucleic acid, a poly(amino acid),] an additional detection reagent, a silicon chip, a glass slide, or any combination thereof.

47. (Amended) [A] The kit[, as claimed in] according to Claim [44] 46, wherein [the] said additional detection reagent is selected from the group consisting of an organelle stain, [an] a labeled immunoreagent, a drug, and an enzyme[, or an enzyme substrate].

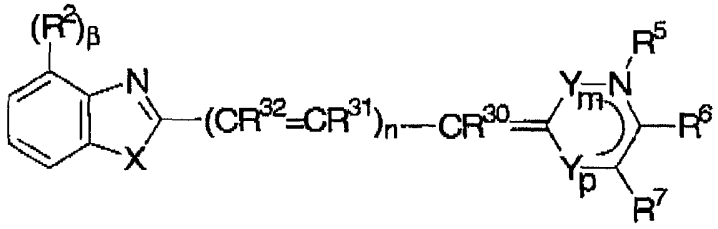
48. (New) The kit according to Claim 47, wherein said R^5 is BRIDGE that is attached to said DYE.

49. (New) The kit according to Claim 47, wherein said kit comprises two to six individual said compounds.

50. (New) The kit according to any one of claims Claim 47, 48 or 49, wherein said organic solvent is DMSO.

51. (New) The complex according to Claim 24, wherein said complex further comprises a detergent.

52. (New) A compound having formula:



wherein R^2 is an alkyl having 1-6 carbon atoms and wherein meta and ortho positions to R^2 are independently and optionally substituted with halogen or an alkyl having 1-6 carbons atoms;

X is selected from the group consisting of O, S, Se, NR^{15}, and $CR^{16}R^{17}$ wherein R^{15} is H or an alkyl group having 1-6 carbons and R^{16} and R^{17} are independently alkyl groups having 1-6 carbons;

n = 0, 1 or 2;

$\beta = 1$;

Y is $-CR^3=CR^4-$;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently selected from the group consisting of hydrogen, an alkyl having 1-6 carbons, a halogen, a CYCLIC SUBSTITUENT, $-OR^8$, $-SR^8$, $-(NR^8R^9)$, TAIL and BRIDGE wherein R^8 and R^9 are independently alkyl groups having 1-6 carbons or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are $-(CH_2)_2-W-(CH_2)_2-$ where W is a single bond, -O-, $-CH_2-$, or $-NR^{10}-$, where R^{10} is H or an alkyl having 1-6 carbons;

or R^6 and R^7 taken in combination form a fused 6-membered aromatic ring wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are independently selected from the group consisting of

hydrogen, halogen, $-OR^8$, $-SR^8$, $-(NR^8R^9)$, CYCLIC SUBSTITUENT, TAIL, BRIDGE, and an alkyl having 1-6 carbons;

R^5 is selected from the group consisting of CYCLIC SUBSTITUENT, TAIL, BRIDGE, a pair of electrons, sulfoalkyl and an alkyl having 1-6 carbons;

R^{30}, R^{31}, and R^{32} are independently selected from the group consisting of H, alkyl having 1-6 carbons, cycloalkyl having 3-10 carbons, aryl, and heteroaryl; and,

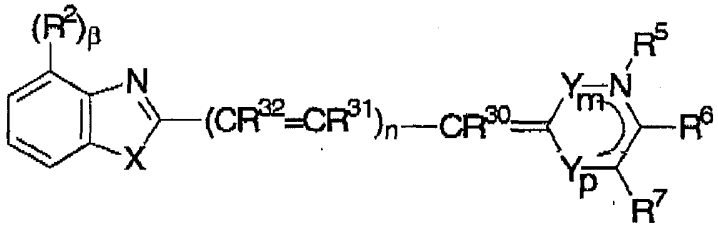
when present, BRIDGE is attached to a DYE compound provided that no more than one of R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13} and R^{14} is BRIDGE;

wherein;

BRIDGE is independently a single covalent bond or a covalent linkage having 1-20 nonhydrogen atoms selected from the group consisting of C, N, O and S;

TAIL is a heteroatom-containing moiety;

DYE is a compound of the formula



wherein X, R^2, n, Y_m, Y_p, R^5, R^6, R^7, R^{30}, R^{31} and R^{32} are as defined above provided that BRIDGE not be any of R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13} and R^{14}.

53. (New) The compound according to Claim 52, wherein

R^2 is methyl; said meta and ortho positions are optionally substituted by halogen; X is S or O; n = 0; m = 1;

R^3 and R^4 are independently selected from the group consisting of H, alkyl, CYCLIC SUBSTITUENT and TAIL;

R^6 and R^7 taken in combination form a fused 6-membered aromatic ring wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are independently hydrogen, -OR^8, or an alkyl having 1-6 carbons wherein R^8 is methyl;

R^5 is selected from the group consisting of CYCLIC SUBSTITUENT, TAIL, BRIDGE, a pair of electrons, and methyl;

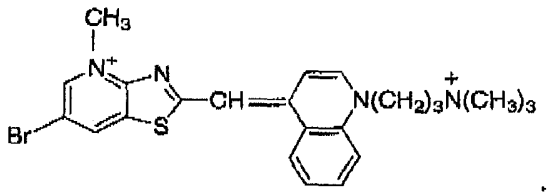
R^{30} is hydrogen.

54. (New) The compound according to Claim 53, wherein X is S, said halogen is chlorine or bromine, R^3 is hydrogen, R^4 is hydrogen or an alkyl and R^5 is selected from the group consisting of methyl, CYCLIC SUBSTITUENT, BRIDGE and TAIL wherein said CYCLIC SUBSTITUENT is an unsubstituted aryl and TAIL comprises formula -$(CH_2)_3N(CH_3)_3$.

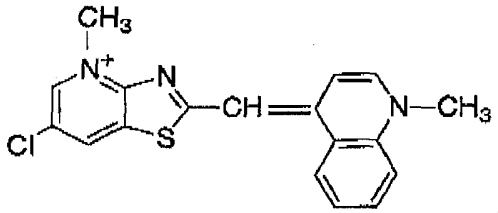
55. (New) The compound according to Claim 54 or 53, wherein said R^5 is BRIDGE comprising formula –$(CH_2)_3N(CH_3)CH_2$-.

56. (New) The compound according to any one of Claims 55, 54 or 53, wherein said BRIDGE is attached to said DYE.

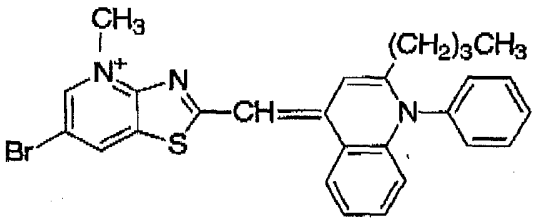
57. (New) The compound according to Claim 54, wherein said compound has the formula:



58. (New) The compound according to Claim 54, wherein said coumpund has the formula:



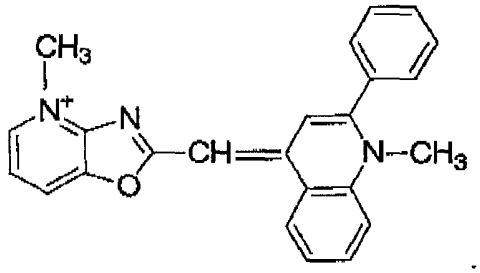
59. (New) The compound according to Claim 54, wherein said compound has the formula:



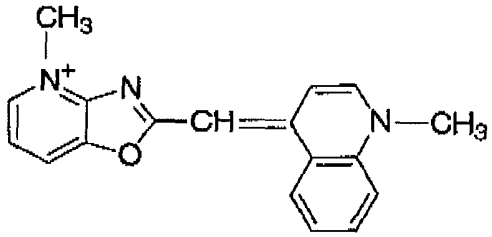
60. (New) The compound according to Claim 53, wherein X is O; R^3 is hydrogen; R^4 is selected from the group consisting of hydrogen, CYCLIC SUBSTITUENT, TAIL and an

alkyl; R^5 is selected from the group consisting of methyl, CYCLIC SUBSTITUENT, BRIDGE and TAIL wherein said CYCLIC SUBSTITUENT is an unsubstituted aryl and said TAIL comprises LINK that is a single covalent bond, SPACER that is a phenyl ring and CAP comprising formula $-(CH)_2N^+CH_3(CH_2CH_3)_2$; R^{11}, R^{12}, R^{13}, and R^{14} are individually hydrogen or $-OCH_3$.

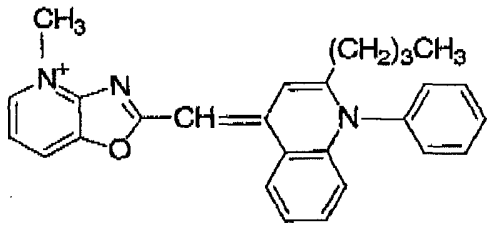
61. (New) The compound according to Claim 60, wherein said compound has the formula:



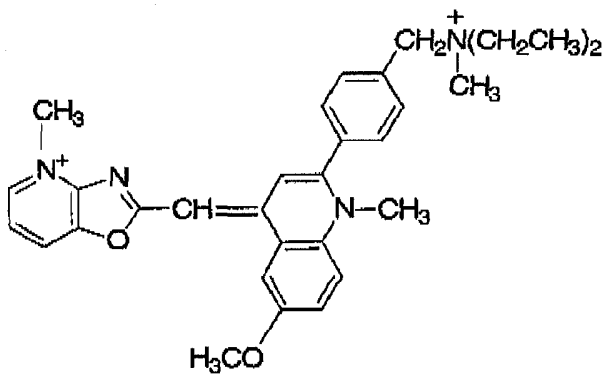
62. (New) The compound according to Claim 60, wherein said compound has the formula:



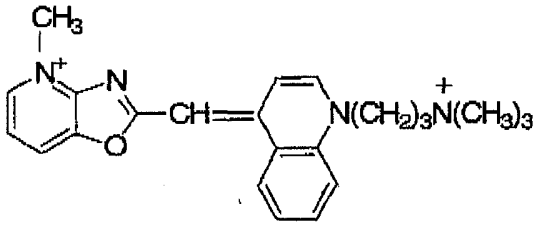
63. (New) The compound according to Claim 60, wherein said compound has the formula:



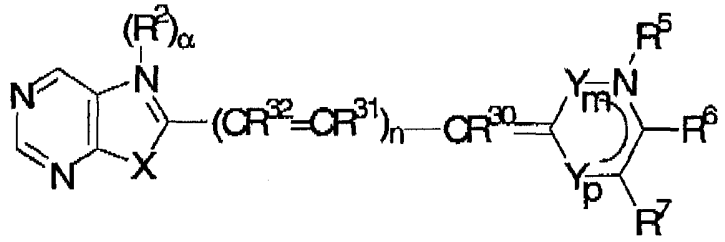
64. (New) The compound according to Claim 60, wherein said compound has the formula:



65. (New) The compound according to Claim 60, wherein said compound has the formula:



66. (New) A compound having formula:



wherein R^2 is an alkyl having 1-6 carbon atoms and fused 6-membered aromatic ring is optionally substituted at a ring carbon by methylthio;

X is selected from the group consisting of O, S, Se, NR^{15}, and $CR^{16}R^{17}$ wherein R^{15} is hydrogen or an alkyl group having 1-6 carbons and R^{16} and R^{17} are independently alkyl groups having 1-6 carbons;

n = 0, 1 or 2;

α = 1;

Y is $-CR^3=CR^4-$;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently selected from the group consisting of hydrogen, an alkyl having 1-6 carbons, a halogen, a CYCLIC SUBSTITUENT, $-OR^8$, $-SR^8$, $-(NR^8R^9)$, TAIL and BRIDGE wherein R^8 and R^9 are independently alkyl groups having 1-6 carbons or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are $-(CH_2)_2-W-(CH_2)_2-$ where W is a single bond, -O-, $-CH_2-$, or $-NR^{10}-$, where R^{10} is H or an alkyl having 1-6 carbons;

or R^6 and R^7 taken in combination form a fused 6-membered aromatic ring wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are independently selected from the group consisting of hydrogen, halogen, $-OR^8$, $-SR^8$, $-(NR^8R^9)$, CYCLIC SUBSTITUENT, TAIL, BRIDGE,

and an alkyl having 1-6 carbons;

R^5 is selected from the group consisting of CYCLIC SUBSTITUENT, TAIL, BRIDGE, a pair of electrons, sulfoalkyl and an alkyl having 1-6 carbons;

R^{30}, R^{31}, and R^{32} are independently selected from the group consisting of H, alkyl having 1-6 carbons, cycloalkyl having 3-10 carbons, aryl, and heteroaryl; and,

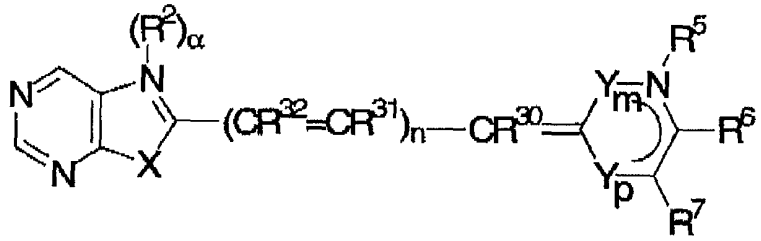
when present, BRIDGE is attached to a DYE compound provided that no more than one of R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13} and R^{14} is BRIDGE;

wherein;

BRIDGE is independently a single covalent bond or a covalent linkage having 1-20 nonhydrogen atoms selected from the group consisting of C, N, O and S;

TAIL is a heteroatom-containing moiety;

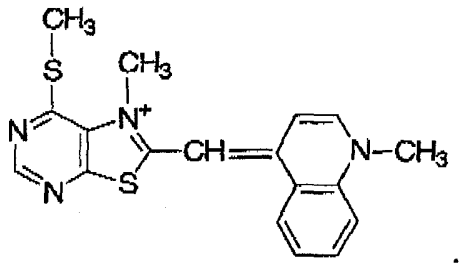
DYE is a compound having formula



wherein X, R^2, n, Y_m, Y_p, R^5, R^6, R^7, R^{30}, R^{31} and R^{32} are as defined above provided that BRIDGE not be any of R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13} and R^{14}.

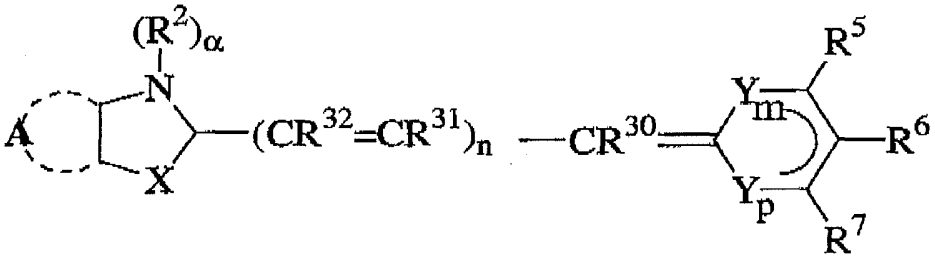
67. (New) The compound according to Claim 66, wherein said 6-membered aromatic ring is substituted by methylthio; X is S; n is 0; m is 1; R^3, R^4, R^{11}, R^{12}, R^{13} and R^{14} are hydrogen and R^5 is methyl.

68. (New) The compound according to Claim 67, wherein said compound has the formula:



69. (New) A solution for staining nucleic acid polymers or poly(amino acids) wherein said solution comprises:

a) one or more compounds having formula



wherein A represents the atoms necessary to form one to two fused aromatic rings having 6 atoms in each ring selected from the group consisting of –C-, CH or $N(R^2)^\beta$, provided at least one of said ring atoms is $N(R^2)^\beta$ wherein aromatic carbons are optionally substituted one or more times by substituents selected from the group consisting of hydrogen, alkyl having from 1-6 carbons, alkoxy having from 1-6 carbons, trifluoromethyl, halogen, methylthio, -L-R_x and -L-S_c;

X is selected from the group consisting of O, S, Se, NR^{15}, and $CR^{16}R^{17}$ wherein R^{15} is

hydrogen or an alkyl group having 1-6 carbons and R^{16} and R^{17} are independently alkyl groups having 1-6 carbons, or R^{16} and R^{17} taken in combination complete a five or six membered saturated ring;

α is 0 or 1 and β is 0 or 1 provided that α + all β = 1;

R^2 is selected from the group consisting of -L-R_x, -L-S_c, TAIL, BRIDGE and an alkyl group having 1-6 carbons that is optionally substituted by sulfo, carboxy, or amino;

n = 0, 1 or 2;

Y is $-CR^3=CR^4-$;

p and m = 0 or 1, such that p + m = 1;

R^3, R^4, R^6, and R^7 are independently selected from the group consisting of hydrogen, an alkyl that is saturated or unsaturated, linear or branched, having 1-6 carbons, a halogen, a CYCLIC SUBSTITUENT, $-OR^8$, $-SR^8$, $-(NR^8R^9)$, TAIL, BRIDGE, -L-R_x and -L-S_c wherein R^8 and R^9 are independently alkyl groups having 1-6 carbons or 1-2 alicyclic or aromatic rings; or R^8 and R^9 taken in combination are $-(CH_2)_2-W-(CH_2)_2-$ where W is a single bond, -O-, $-CH_2-$, or $-NR^{10}-$, where R^{10} is H or an alkyl having 1-6 carbons;

or R^6 and R^7 taken in combination form a fused 6-membered aromatic ring wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are independently selected from the group consisting of hydrogen, halogen, $-OR^8$, $-SR^8$, $-(NR^8R^9)$, a CYCLIC SUBSTITUENT, TAIL, BRIDGE, -L-R_x, -L-S_c and a saturated or unsaturated alkyl having 1-6 carbons that is linear or branched;

R^5 is selected from the group consisting of CYCLIC SUBSTITUENT, TAIL, BRIDGE, -L-R_x, -L-S_c, a pair of electrons, sulfoalkyl and a saturated or unsaturated alkyl having 1-

6 carbons that is linear or branched;

R^{30}, R^{31}, and R^{32} are independently selected from the group consisting of hydrogen, alkyl having 1-6 carbons, cycloalkyl having 3-10 carbons, aryl, and heteroaryl; and,

when present, BRIDGE is attached to a DYE compound provided that no more than one of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15} is BRIDGE;

wherein

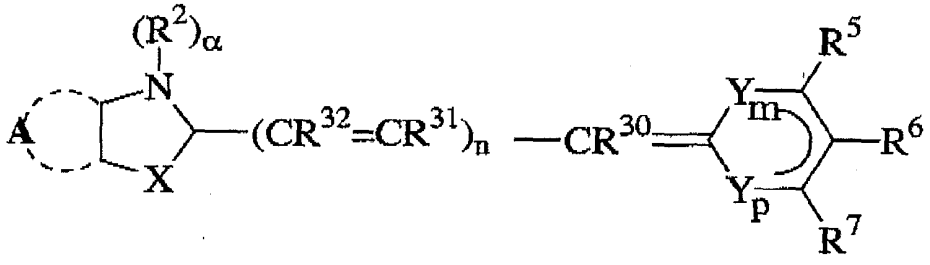
L and BRIDGE are independently a single covalent bond or a covalent linkage having 1-20 nonhydrogen atoms selected from the group consisting of C, N, O and S;

R_x is a reactive group;

S_c is a conjugated substance;

TAIL is a heteroatom-containing moiety;

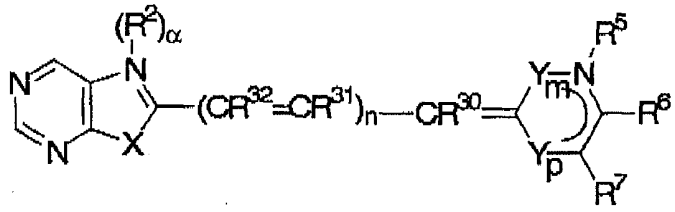
DYE is a compound having formula



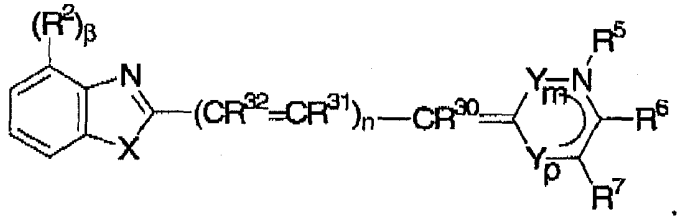
wherein A, X, R^2, α, n, Y_m, Y_p, R^5, R^6, R^7, R^{30}, R^{31} and R^{32} are as defined above provided that BRIDGE not be any of R^2, R^3, R^4, R^5, R^6, R^7, R^{11}, R^{12}, R^{13}, R^{14} and R^{15}; and,

b) an organic solvent.

70. (New) The solution according to Claim 69, wherein said compound has the formula



or



71. (New) The solution according to Claim 70, wherein R^2 is methyl; said 6-membered aromatic carbons are optionally substituted one or more times by substituents selected from the group consisting of hydrogen, alkyl having from 1-6 carbons, halogen, methylthio; X is S or O; n = 0; m = 1;

R^3 and R^4 are independently selected from the group consisting of hydrogen, alkyl, CYCLIC SUBSTITUENT and TAIL;

R^6 and R^7 taken in combination form a fused 6-membered aromatic ring wherein ring substituents R^{11}, R^{12}, R^{13}, and R^{14} are independently hydrogen, $-OR^8$, or an alkyl having 1-6 carbons wherein R^8 is methyl;

R^5 is selected from the group consisting of CYCLIC SUBSTITUENT, TAIL, BRIDGE, a pair of electrons, and methyl;

R^{30} is hydrogen.

72. (New) The solution according to Claim 71, wherein R^3 is hydrogen, said CYCLIC SUBSTITUENT is an unsubstituted aryl and TAIL comprises LINK that is a single covalent bond, SPACER that is a phenyl ring or a linear alkyl and CAP comprising formula $-(CH)_2N^+CH_3(CH_2CH_3)_2$ or formula $-N(CH_3)_3$.

73. (New) The solution according to Claim 72, wherein R^5 is BRIDGE comprising formula $-(CH_2)_3N(CH_3)CH_2-$ wherein DYE is attached to said BRIDGE.

74. (New) The solution according to Claim 72 or 73 wherein said organic solvent is DMSO.

Haugland and Yue
Serial No. 09/557,275

Respectfully submitted,

Date: Aug. 21, 2002

Koren J. Anderson, PhD
Reg. No. 51,061

Molecular Probes, Inc.
P.O. Box 22010
Eugene, Oregon, 97402
Phone: (541) 984-5656
Facsimile: (541) 465- 8354